

**PATENT APPLICATION**  
**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**  
**BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

In re Application of: Attorney Docket No: **Q92644**  
**Scott GAYNOR et al.** Conf. No.: **1924**  
Application No.: **10/579,341** Group Art Unit: **1621**  
Filed: **August 24, 2006** Examiner: **Brooks, Clinton**  
For: **CROSSLINKABLE ARYLAMINE COMPOUNDS AND CONJUGATED**  
**OLIGOMERS OF POLYMERS BASED THEREON**

**APPEAL BRIEF UNDER 37 C.F.R. § 41.37**

**MAIL STOP APPEAL BRIEF - PATENTS**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

In accordance with the provisions of 37 C.F.R. § 41.37, Appellant submits the following:

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**I. REAL PARTY IN INTEREST**

SUMITOMO CHEMICAL COMPANY, LIMITED, having a business address of  
27 1, Shinkawa 2-chome Chuo-ku Tokyo, JAPAN, is the real party in interest by virtue of the  
Assignment recorded at REEL 018357 and FRAME 0748.

**II. RELATED APPEALS AND INTERFERENCES**

All prior or pending appeals, interferences or judicial proceedings, known to any inventors, any attorneys or agents who prepared or prosecuted the application on appeal and any other person who was substantively involved in the preparation of prosecution of the application on appeal, and that are related to, directly affect, or would be directly affected by, or have a bearing on the Board's decision in the appeal, are as follows:

None.

Appellants, Appellants' legal representatives, and the Assignee of this application are not aware of any other appeals or interferences that will directly affect, or be affected by, or have a bearing on the Board's decision in the pending appeal.

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**III. STATUS OF CLAIMS**

Claims 1-4 and 6-16 are pending, of which Claims 10-16 are withdrawn from consideration as the result of Applicants' election filed September 2, 2009. Claim 5 was canceled in the Amendment filed March 8, 2010.

Elected Claims 1-4 and 6-9 stand rejected and are the claims involved in this appeal.

Pursuant to 37 C.F.R. § 41.37(c)(1)(viii), a copy of Claims 1-4 and 6-9 involved in the appeal is set forth in the attached Claims Appendix.

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**IV. STATUS OF AMENDMENTS**

The status of all amendments filed after final rejection is as follows:

A final Office Action was mailed June 7, 2010, and Applicants filed a request for reconsideration in the Response Under 37 C.F.R. § 1.116 on December 17, 2010. The claims were not amended in this Response. According to the Advisory Action dated January 5, 2011, the Examiner considered the remarks in the Response.

Applicants also note that the claims were last amended in the Amendment Under 37 C.F.R. § 1.111 filed March 8, 2010, which responded to the non-final Office Action dated September 11, 2009. These claim amendments were entered and considered by the Examiner.

**V. SUMMARY OF THE CLAIMED SUBJECT MATTER**

Claim 1 is the only independent claim on appeal.

The present application describes novel crosslinkable arylamine compounds and methods for their preparation (specification at page 1, lines 5-6). In particular, the present application describes novel compounds for use in various layers of a multilayer LED, such as hole transport layers and interlayers of a multilayer LED, as well as in other electronic devices such as field effect transistors (FET's), photovoltaic cells, and even for integrated circuits or printed circuit boards (specification at page 1, line 33 to page 2, line 2).

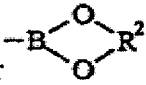
Consistent with the above, Claim 1 recites arylamine compounds of the following formula (I) **{specification at page 2, lines 4-6}**:



wherein,

Ar independently each occurrence is a group comprising one or more divalent aromatic groups, and optionally two Ar groups separated by a single NX group may be joined together by a second covalent bond or by a bridging group, thereby forming a fused multiple ring system **{specification at page 2, lines 7-9}**;

X is an inert substituent or a cross-linkable group, with the proviso that in at least one occurrence in said compound, X is a crosslinkable group **{specification at page 2, lines 10-11}**;

Z independently each occurrence is halo, cyano, triflate azide,  $-B(OR^1)_2$ , or  **{specification at page 2, line 12 and page 4, lines 24-26}**,

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wherein  $R^1$ , independently in each occurrence, is hydrogen or a  $C_{1-10}$  alkyl group, and  $R^2$ , independently each occurrence, is a  $C_{2-10}$  alkylene group {**specification at page 4, lines 27-29**},  
 $n$  is 1 or 2 {**specification at page 2, line 13**}; and  
 $n'$  is 0, 1 or 2 {**specification at page 2, line 14**}.

Due to the pendant nature of the crosslinkable group, X, the arylamine compounds according to Claim 1 are capable of forming oligomers and polymers containing relatively large amounts of conjugated unsaturation, thereby resulting in improved charge transport properties (specification at page 2, lines 15-17). Oligomers and polymers, including copolymers, resulting from crosslinking compositions comprising the arylamine compounds according to Claim 1 are advantageously characterized by reduced ionization potential and improved conductivity (specification at page 2, lines 17-20). Moreover, the arylamine compounds according to Claim 1 are capable of forming crosslinked, solvent resistant films that are well suited for use as interlayers in electroluminescent devices (specification at page 2, lines 20-21).

**VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL**

The grounds of rejection to be reviewed, including the statute applied, the claims subject to each rejection and the references relied upon by the Examiner are as follows:

Claims 1-4 and 6-9 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Woo et al. (U.S. Patent No. 5,929,194).



**VII. ARGUMENT**

***The Presently Claimed Arylamine Compound according to the Formula (I) is Patentable over Woo et al. (U.S. Patent No. 5,929,194)***

The Supreme Court in *KSR*, quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006), indicated that “rejections on obviousness cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007). Post *KSR*, the Federal Circuit has held that in order to establish a *prima facie* case of obviousness in cases involving the chemical arts, it is necessary to identify some reason that would have led a person having ordinary skill in the art to modify a known compound in a particular manner to obtain a predicable outcome. See *Eisai Co. Ltd. v. Dr. Reddy’s Laboratories, Ltd.*, 533 F.3d 1353, 1359 (Fed. Cir. 2008).

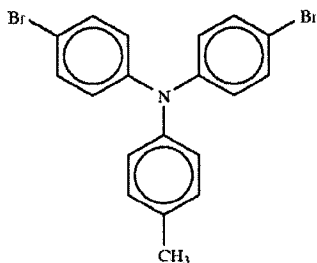
For at least the reasons set forth below, the Examiner has failed to establish that one of ordinary skill in the art would have had any reason to arrive at the claimed arylamine compound according to formula (I) from the compounds described in Woo et al. (U.S. Patent No. 5,929,194) (hereinafter “Woo”). Accordingly, the Examiner has not met this burden for establishing a *prima facie* case of obviousness in the case involving the chemical arts, and thus, Appellants respectfully request the Board to reverse the Examiner’s rejection of Claims 1-4 and 6-9 as being unpatentable over Woo.

The Examiner has taken the position that one of ordinary skill would have substituted the cyclobutene containing aromatic ring of Examples 5 and 21 of Woo for the toluene ring of Example 11 of Woo. According to the Examiner, this substitution would allegedly meet the

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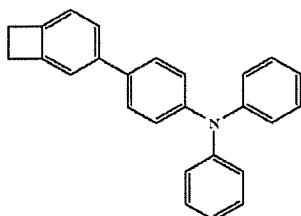
requirement of the claimed arylamine compounds according to formula (I) as recited in Claim 1 (pages 3-8, and page 9, last paragraph, of the Office Action dated June 7, 2010).

More specifically, the Examiner pointed to Example 11 of Woo as teaching the following compound, which has a di(4-bromophenyl) structure.

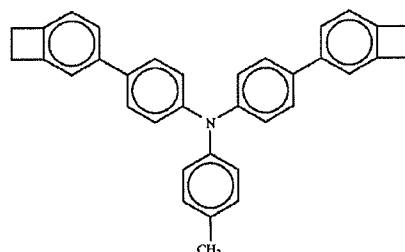


(Example 11 of Woo)

Further, the Examiner pointed to Examples 5 and 21 of Woo as teaching arylamine compounds containing cyclobutene group.



(Example 5 of Woo)



(Example 21 of Woo)

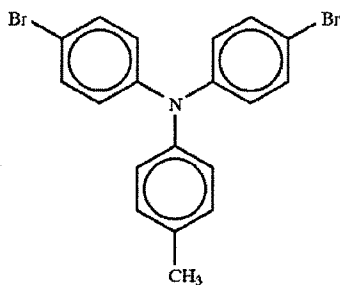
According to the Examiner, the motivation to modify Woo to substitute the cyclobutene containing aromatic ring of Examples 5 and 21 of Woo, for the toluene ring of Example 11 of Woo, is that Woo teaches advantages of the cyclobutyl containing moiety, and that one would be motivated to add the cyclobutene containing group to add these advantages. Further, the Examiner has taken the position that one would have been motivated to substitute one C<sub>1</sub>-C<sub>20</sub> hydrocarbonyl group for another because they are structurally similar compounds (page

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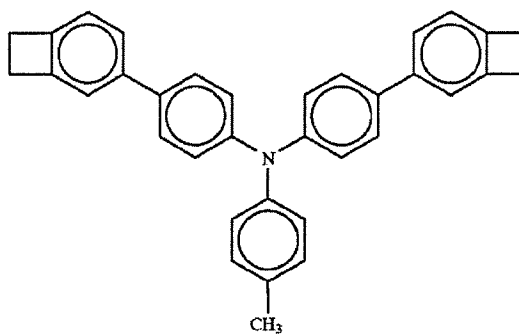
9, last paragraph, of the Office Action dated June 7, 2010).

Appellants respectfully disagree with the Examiner's characterization of Woo and reasoning in support of the rejection. There would have been no reason to select and modify the compound of Example 11 of Woo, in the manner suggested by the Examiner, to arrive at the structure of the claimed arylamine compound, with a reasonable expectation of success.

Woo is directed to poly(tertiary di- or polyarylamines) which have more than one aryl moiety which is further substituted with a moiety capable of chain extension or crosslinking (Abstract). In addition, Woo discloses that the haloaromatic compound having a reactive group capable of crosslinking or chain extension includes halogen-substituted benzocyclobutene (col. 9, lines 13 to 15). **In particular, the Examiner has cited Example 11 of Woo as being directed to the preparation of N,N'-di-(4-bromophenyl)-p-tolylamine, which was employed by Woo as a starting material to react with 4-benzocyclobuteneboronic acid to make the arylamine compound of Example 21.**



(Example 11 of Woo)



(Example 21 of Woo)

Accordingly, one reason the Examiner's asserted motivation to modify the compound of Example 11 of Woo lacks merit is that one of ordinary skill in the art would not have been

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motivated to modify the structure of a starting material (the compound of Example 11 of Woo) with the structure of a final product (Example 21 of Woo). In other words, there would have been no reason to substitute the toluene ring of Example 11 with the cyclobutene containing aromatic ring of Examples 5 and 21 of Woo. As noted above, there must have been some reason for starting with, or modifying, the lead compound (i.e., the compound of Example 11) other than the fact that the lead compound exists. *See Eisai Co.*, 533 F.3d 1353 (2008).

In addition, the Examiner has taken the position that column 7 of Woo contains relevant teachings (page 6, second line from the bottom, to page 7, fourth line from the bottom, of the Office Action dated June 7, 2010). In particular, the Examiner asserted in the last three lines of the above section of the Detailed Action that:

R<sup>3'</sup> can be a C1-20 hydrocarbyl moiety. A benzocyclobutene moiety is a C8 containing hydrocarbyl group. Thus, this genus encompasses the elected species and at least other members of the claimed genus.

In other words, the Examiner seems to be of the belief that R<sup>3'</sup> of Woo is a C1-20 hydrocarbyl moiety of the presently claimed invention.

Appellants respectfully disagree.

Benzocyclobutene moiety falls into the category of crosslinkable group, and is clearly distinguishable from the C1-20 hydrocarbyl moiety of Woo. For example, Woo provides a definition of R<sup>3</sup> in column 5, lines 25 to 32, in which “C1-20 hydrocarbyl moiety” and “a moiety corresponding to the formula -Ar<sup>1</sup>(R<sup>2</sup>)-Ar<sup>2</sup>-E” are clearly distinguished. The moiety corresponding to the formula -Ar<sup>1</sup>(R<sup>2</sup>)-Ar<sup>2</sup>-E is a crosslinkable group because the moiety contains group E, which is a reactive group capable of undergoing chain extension or

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crosslinking according to the definition of E in column 4, lines 53 to 62 of Woo. Accordingly, the “C1-20 hydrocarbyl moiety” and the “crosslinkable group” are clearly distinguished by Woo. Therefore, the Examiner has mistakenly asserted that the C1-20 hydrocarbyl moiety of R<sup>3</sup> encompasses the crosslinkable group benzocyclobutene.

In summary, Appellants submit that presently claimed arylamine compounds according to formula (I) are patentable over Woo:

(1) The Examiner’s asserted motivation to modify the compound of Example 11 of Woo lacks merit because one of ordinary skill in the art would not have been motivated to modify the structure of a starting material (the compound of Example 11 of Woo) with the structure of a final product (the compound of Example 5 or Example 21 of Woo), that is, there would have been no reason to substitute the toluene ring of Example 11 with the cyclobutene containing aromatic ring of Examples 5 or 21 of Woo; and.

(2) The Examiner has improperly asserted that one of ordinary skill in the art would have understood the substituent R<sup>3</sup> of Woo as comprising a C1-20 hydrocarbyl moiety.

In view of the above, Appellants respectfully request the Board to reverse the Examiner’s rejection of Claims 1-4 and 6-9 as being unpatentable over Woo.

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**VIII. CONCLUSION**

The statutory fee (37 C.F.R. §41.37(a) and 1.17(c)) is being remitted. The U.S. Patent and Trademark Office is hereby directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

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WASHINGTON OFFICE

**23373**

CUSTOMER NUMBER

Date: March 7, 2011

**CLAIMS APPENDIX**

CLAIMS 1-4 and 6-9 ON APPEAL:

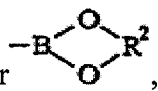
1. An arylamine compound of the formula:



wherein,

Ar independently each occurrence is a group comprising one or more divalent aromatic groups, and optionally two Ar groups separated by a single NX group may be joined together by a second covalent bond or by a bridging group, thereby forming a fused multiple ring system;

X is an inert substituent or a cross-linkable group, with the proviso that in at least one occurrence in said compound, X is a crosslinkable group;

Z independently each occurrence is halo, cyano, triflate azide,  $-\text{B}(\text{OR}^1)_2$ , or ,

wherein  $\text{R}^1$ , independently in each occurrence, is hydrogen or a  $\text{C}_{1-10}$  alkyl group, and  $\text{R}^2$ , independently each occurrence, is a  $\text{C}_{2-10}$  alkylene group,

n is 1 or 2; and

$n'$  is 0, 1 or 2.

2. A compound according to claim 1 wherein X in at least one occurrence is a moiety containing a double bond, a triple bond, a precursor capable of in situ formation of a double bond, or a heterocyclic, addition polymerizable group.

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3. A compound according to claim 1 wherein X in at least one occurrence is selected from the group consisting of benzocyclobutanyl groups and substituted C<sub>6-12</sub> arylene groups containing one or more substituents selected, from the group consisting of benzocyclobutane, azide, oxirane, di(hydrocarbyl)amino, cyanate ester, hydroxy, glycidyl ether, C<sub>1-4</sub> alkylacrylate, C.sub.1-4 alkylmethacrylate, ethenyl, ethenyloxy, perfluoroethenyloxy, ethynyl, maleimide, nadimide, tri(C<sub>1-4</sub>)-alkylsiloxy, tri(C.sub.1-4)alkylsilyl, and halogenated derivatives thereof.

4. A compound according to claim 1 wherein X in at least one occurrence is 1-benzo-3,4-cyclobutane or 4-phenyl-1-(benzo-3,4-cyclobutane).

6. A compound according to claim 1 wherein Ar each occurrence is phenylene, 9,9-di(C<sub>1-20</sub>alkyl)fluorenyl, or a combination thereof; X is 3,4-benzocyclobutan-1-yl, ethenyl or p-ethenylphenyl; Z is bromine or hydrogen; n is 1 or 2; and n' is 0 or 1.

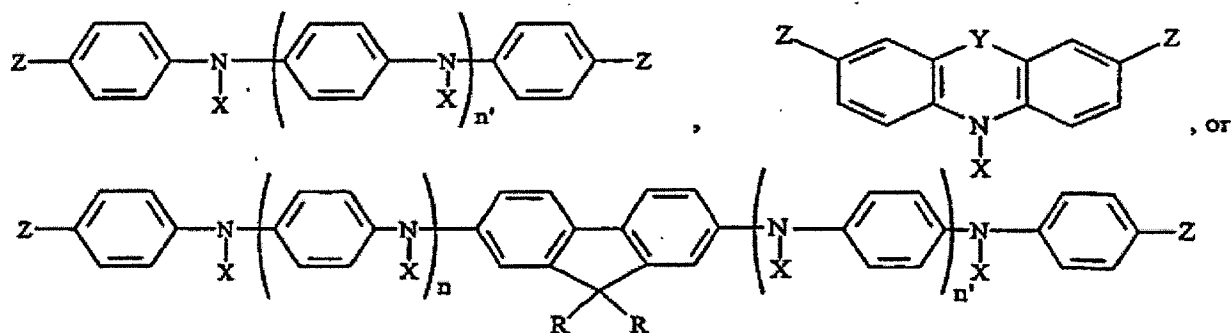
7. A compound according to claim 6 wherein Ar each occurrence is phenylene; each X group is 3,4-benzocyclobutan-1-yl; Z each occurrence is bromine; n is 1 or 2; and n' is 0.

8. A compound according to claim 7 wherein n is 1.



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9. A compound according to claim 1 having the formula:



wherein Y is a covalent bond, O, S or NR; where

R independently each occurrence is i) hydrogen; ii) halogen; iii) a C<sub>1-20</sub> hydrocarbyl group; iv) a hydrocarbyl group substituted with one or more heteroatom containing groups containing up to 20 atoms not counting hydrogen and wherein the heteroatom is selected from S, N, O, P, B or Si; v) a halogenated derivative of iii) or iv); or vi) a substituted derivative of iii) or iv) wherein the substituent is a crosslinkable X group; and

n, n', X, and Z are as previously defined in claim 1.

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**EVIDENCE APPENDIX**

None.

Pursuant to 37 C.F.R. § 41.37(c)(1)(ix), no evidence submitted pursuant to 37 C.F.R. §§ 1.130, 1.131, or 1.132 or any other evidence entered by the Examiner is being relied upon by Appellants in the appeal.

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**RELATED PROCEEDINGS APPENDIX**

Appellants, Appellants' legal representatives, and the Assignee of this application are not aware of any other related proceedings that will directly affect, or be affected by, or have a bearing on the Board's decision in the pending appeal.